Committee on Resources,

Subcommittee on Energy & Mineral Resources

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Witness Statement

Testimony of
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Madam Chairman and Members of the Subcommittee, I appreciate the opportunity to appear before you today to present testimony on the Minerals Management Service (MMS) estimates for the United States Outer Continental Shelf (OCS) crude oil and natural gas resource base and the underlying methodology used by the MMS in creating these estimates.

Background

As you are aware, MMS's mission consists of two major programs: Offshore Minerals Management and Minerals Revenue management. The leasing and oversight of mineral operations on the OCS and all mineral revenue management functions for Federal (onshore and offshore) and American Indian lands are centralized within the bureau. In 2000, OCS oil and natural gas production accounted for roughly 25 and 26 percent, respectively, of our nation's domestic energy production - oil production was over 500 million barrels and natural gas production was over 5 trillion cubit feet. The amount of oil and natural gas production in 2000 was the most ever produced on the OCS. In addition, in fiscal year 2000, MMS collected and distributed about $7.8 billion in mineral leasing revenues from Federal and American Indian lands.

In its role as manager of the Nation's OCS energy and nonenergy mineral resources, the bureau's long-term strategy is to assess those resources; determine, in consultation with affected parties, if they can be developed in an environmentally sound manner; and, if leased, to regulate activities to ensure safety and environmental protection. This long-term strategy affects the way MMS manages OCS resources and the way MMS faces the challenge of maintaining a "balance" between providing energy and protecting the Nation's unique and sensitive environments and other natural resources.

An integral element in this long-term strategy is the ability to identify the most promising areas of the OCS for the occurrence of crude oil and natural gas accumulations and to quantify the amounts of oil and natural gas that may exist in these areas. However, since much of the OCS has not been thoroughly explored, we must deal with the uncertainty that these resources may or may not exist in these most promising areas.

We must also develop indicators of the economic viability of these resources under a variety of economic and price scenarios and costs associated with exploration, development, and production activities for the specific areas where the resources may occur. Within MMS, these functions are performed through the Resource Evaluation (RE) Program component of the Offshore Minerals Management Program.

MMS Resource Evaluation (RE) Program

The RE Program is focused upon the acquisition and analysis of geologic, geophysical, petroleum engineering, and economic data and information related to the mineral potential (predominately crude oil and natural gas) of OCS lands. The primary source of these data and information is the oil and natural gas industry, which conducts exploration, development, and production activities on OCS lands. The MMS acquires these data under terms of lease agreements or permits. Hence, the data and information are considered "proprietary" by MMS regulations and generally not available for public release.

The RE Program functions encompass all cycles of OCS program activities and provide technical data and information supporting a wide array of program and regulatory decisions affecting Offshore Minerals Management--including OCS leasing decisions, bid adequacy determinations, environmental analyses, royalty-relief considerations and a myriad of related issues and decisions that must incorporate specific knowledge about the amounts of oil and natural gas resources and reserves.

In performing these functions, MMS personnel must constantly update the information databases to reflect new data produced by current drilling and seismic activities performed by industry as well as update production data from known fields as crude oil and natural gas are produced from these fields. There are several "by-products" that result from our ongoing geologic, economic, and engineering analyses. For example, MMS publishes annual reports that update the estimates of proved reserves for Gulf of Mexico and Pacific OCS fields, and the Gulf of Mexico are all valuable information sources to the industry, the States, and the public. These annual reports are located on the MMS Internet website under the Gulf of Mexico and Pacific Region webpages. In April 2000, the MMS held a Natural Gas Symposium in Houston, Texas, where the participants discussed and identified the role of the Federal OCS in supplying the future natural gas demand of the U.S. The information presented at the Symposium is available on our MMS homepage.

OCS Resource Assessments

As background to discussing any resource estimates of crude oil and natural gas accumulations on the OCS, it is important to understand the differences between the terms "undiscovered resources" and "known reserves" - "proved" and "unproved."

"Undiscovered resources" are quantities of crude oil and natural gas that geologic data and information suggest may exist in areas outside of known oil and natural gas fields. However, verification of the existence of crude oil and/or natural gas can only be determined from exploratory drilling activities and verification of the ultimate number and sizes of fields is only truly known after an area has been thoroughly explored, developed, and all discoveries produced--a timeframe generally covering decades.

"Known reserves" are those crude oil and natural gas accumulations that have been discovered and determined to be economically viable to develop and produce. Estimates of known reserves are reported in two categories by MMS: "Proved" reserves are those accumulations that have existing production and transportation facilities or regulatory commitments for installation of such facilities. "Unproved" reserves

are those accumulations that have been discovered, but lack sufficient geologic and economic studies by MMS and OCS lessees to determine whether such discoveries can be commercially developed.

Of note, MMS reserve and resource estimates address conventionally recoverable crude oil and natural gas quantities--that is, estimates do not include accumulations of "heavy oil," oil shales, gas hydrates, coalbed methane, or similar continuous-type hydrocarbon occurrences.

OCS Known Reserve Estimates

Based on the most recently published report as of December 31, 1998, MMS estimates of "proved" reserves for the OCS are 3.8 billion barrels of oil (Bbbl) and 31.3 trillion cubic feet (TCF) of natural gas. Additionally, MMS estimates of "unproved" reserves for the OCS are 2.3 Bbbl of oil and 6.0 TCF of natural gas.

OCS Undiscovered Resources

Previous OCS Resource Assessments

Since its creation in 1982, MMS has completed four systematic assessments of Federal OCS undiscovered oil and natural gas resources, including the 2000 update. The results of the first resource assessment and the methodologies used to develop these estimates were published in a 1985 MMS report entitled *Estimates of Undiscovered, Economically Recoverable Oil and Natural Gas Resources for the Outer Continental Shelf as of July 1984*. Following release of the MMS report in 1985, MMS agreed to join the U.S. Geological Survey (USGS) in conducting a joint, concurrent resource assessment of the United States (both onshore and offshore) to provide

the Department of the Interior, Congress, and other public and private organizations with estimates reflecting consistent timeframes. A National Academy of Sciences (NAS) panel reviewed the 1985 resource assessment and its resource estimate methodologies and recommended certain changes for future assessments.

The second MMS assessment was conducted using improved methodology. The results of this "National Assessment" were published in 1989 in a joint MMS/USGS publication entitled *Estimates of Undiscovered, Conventional Oil and Gas Resources in the United States - A Part of the Nation's Endowment*. Subsequently, MMS reported a more detailed set of results from this joint assessment in 1990 in an MMS report entitled *Estimates of Undiscovered Oil and Gas Resources for the Outer Continental Shelf as of January 1987*.

Similarly, an NAS panel also reviewed MMS procedures employed in its second resource assessment and additional recommendations were published.

In view of the importance of such estimates to outside private and public interest groups, additional reviews of the MMS (and USGS) methodologies and report procedures were conducted by the Association of American State Geologists (AASG), the Energy Information Administration (EIA, U.S. Department of Energy), and the American Petroleum Institute (API). The AASG and EIA reviews resulted in published reports with technical recommendations for enhancing the methodologies employed by both MMS and USGS, while the API review resulted in private recommendations to the Department.

In preparation for conducting its third systematic OCS resource assessment (1995), MMS not only took into account the technical recommendations of NAS and others but also looked internally at other ways to improve on its past efforts. Because the results of the resource assessment would be used by different customers, each with different information needs and levels of technical sophistication, the bureau devoted considerable time and attention to improving on the way the estimates are made and how they are reported. Customers (user groups) surveyed include:

- MMS/DOI decisionmakers;
- Federal and State Agencies and Congress;
- Oil/Gas and related industries;
- Geologic and scientific communities and academia; and
- The general public.

Methodology

Armed with the technical recommendations and the realistic conclusion that the needs of our customers (including ourselves) could be better met, MMS embarked on an effort in 1991 to revise our resource estimation and reporting procedures. Our specific goals were to establish a method for estimation that:

- Maintained the strong points of earlier methodologies;
- Utilized the extensive amount of proprietary geological and geophysical data within MMS databases to the fullest extent; and
- Provided MMS geologists' flexibility to use their judgment to capture a broad range of possible geologic interpretations to address specific areas.

  In addition, we wanted to:

- Produce functional/understandable results;
- Reflect the high quality science inherent in the MMS activities addressing resource assessment and estimation;
- Ensure that estimates reflect geologic potential (known and unknown) as well as reflect risks and uncertainties;
- Separate determinations of economic viability from the process of estimating geologic potential; and,
- Report estimates and related information to a broader audience.

The Petroleum Exploration and Resource Evaluation System (PETRIMES), a probabilistic play analysis model which was used by the Geological Survey of Canada, was chosen as the basic platform for the present assessment of geologic resources. Most of the resource assessment models currently in use, by either industry or other government agencies, provide estimated resources in aggregated numbers

representing total resources as a distribution. However, PETRIMES can also provide an estimate of the number and size of oil and natural gas pools that remain to be discovered. That information is very useful for planning and decisionmaking processes related to exploration and development of OCS resources.

One drawback to PETRIMES, however, is that it was designed to assess a single commodity play, such as an oil play or a gas play. In reality, OCS plays are (in most cases) mixed plays containing both oil and gas pools. To utilize PETRIMES for the assessment of OCS resources, MMS implemented a number of changes to the original PETRIMES program. The most important change made to the program was to provide the ability to separate estimation of both liquid (condensates and oil) and gas (associated gas and nonassociated gas) phases required for an accurate economic evaluation of the OCS. The modified version of PETRIMES developed by MMS is called the Geologic Resource Assessment Program (GRASP).

The Probabilistic Resource Estimation Offshore (PRESTO) model, developed by MMS and used in its 1987 assessment, was modified to accept the assessed output of GRASP at the pool level to determine the economically recoverable resources at the geologic basin level and higher. Unlike the 1987 resource assessment, where economic resources were estimated for only two sets of distinct oil and gas prices inflated over time, the present assessment depicts the uncertainty of assessed results by providing a continuous series of resource values over a range of prices (price supply curves) for each geologic basin, province, and area.

In addition to adopting revised geologic modeling approaches and computer models in its 1995 resource assessment, the MMS also opened up the process of developing estimates for the OCS by holding public workshops for industry, academia, and other interested parties to discuss MMS geologic interpretations and assumptions to be used in the estimation process. We also retained the services of two outside experts in the petroleum assessment community--both of which had served on NAS panels reviewing previous MMS assessments--to provide technical advice to MMS scientists.

Finally, the results of the 1995 OCS resource assessment were published in a format that allow for more openness in OCS resource management decisions--reporting maps of the most promising plays, estimates of the number and sizes of accumulations that may exist within these areas, price-supply curves for examining the impacts of uncertain future oil and natural gas prices on the economic viability of the resources, and a substantial amount of supporting assumptions and underlying geologic information. Industry can use this information for prioritizing plays to be explored; plays that will benefit from further development and plays that need cost improvements.

The 1995 OCS resource assessment also contained both a "geologic assessment" section and an "economic viability" section. In view of the extensive amount of data and information available, MMS issued an "Executive Summary" of its OCS resource estimates as well as technical, in-depth results through three regional reports (Gulf of Mexico/Atlantic Region, Pacific Region, and Alaska Region).

2000 OCS Resource Assessment

This assessment represents an estimation of the undiscovered hydrocarbon potential of the OCS was done to support staff work and analysis needed in formulating the next 5-Year Oil and Gas Leasing Program covering the timeframe 2002-2007. It should be noted that the methodology for the 2000 assessment has not changed significantly from that used in the previous 1995 assessment.

The assessment also is used by MMS in the decisionmaking process on many programmatic issues. Further,

it provides important information when conducting environmental studies and the analysis of options on numerous offshore issues. Industry uses the assessment as another piece of scientific information in formulating its business strategies, and the States and interest groups do the same.

While previous assessments were performed concurrently with an effort by the USGS, the current assessment was not a joint effort. This is due to the fact that the USGS does "continuous assessments" and updates specific areas all the time. In contrast, the MMS 2000 OCS assessment covers a specific time period, often targeted to meet specified regulatory requirements, such as preparation of a 5-Year Leasing Program. Therefore, it was not practical to conduct a joint assessment.

The 2000 assessment presents the updated assessment results since the 1995 assessment for the Alaska, Atlantic, and Gulf of Mexico OCS Regions. In the Alaska Region only the Beaufort and Chukchi Seas, Hope Basin and Cook Inlet areas were updated, as other planning areas lacked new data and changes since the last assessment. The Pacific OCS Region was not updated for the same reasons. The Atlantic OCS Region was re-evaluated to reflect recent exploration results offshore Nova Scotia, current exploration and production technologies, and to make the water depth divisions compatible with the ones now being used in the Gulf of Mexico.

The MMS has recently made public the 2000 assessment, and I have included a copy of the assessment with my written testimony for the hearing record. The total mean undiscovered, conventionally recoverable resources for the United States OCS are 75.0 billion barrels of oil and 362.2 trillion cubic feet of natural gas. Within that total, MMS determined that the undiscovered conventionally recoverable resources foregone by the 1998 moratoria (i.e., the President's June 1998 OCS decision) would be approximately 16 billion barrels of oil and 62 trillion cubic feet of gas.

The total mean undiscovered economically recoverable resources for the United States OCS are 26.6 billion barrels of oil and 116.8 trillion cubic feet of gas at prices of $18 per barrel and $2.11 per thousand cubic feet, respectively, and 46.7 billion barrels of oil and 168.1 trillion cubic feet of gas at prices of $30 per barrel and $3.52 per thousand cubic feet, respectively.

A Comparison of the 1995 and 2000 Assessments

The current assessment resulted in an increase from the 1995 estimates of 29.4 billion barrels of oil and 94.2 TCF of gas in OCS undiscovered conventionally recoverable resources. The increase occurs almost entirely in the Gulf of Mexico based on deepwater exploration results and additional areas assessed. These new areas include the deep, older section of the Central and Western Gulf shelf below 20,000 feet, the Cenozoic section beyond the Sigsbee Escarpment, and the deepwater Mesozoic section not on the Florida Platform. Of the three areas, the last is the most significant. Regional reports are also being prepared that highlight the findings of the 2000 assessment.

Conclusion

By building on our past efforts and methodologies, we believe our current resource assessment, and thus the resulting information, is superior to previous MMS assessments. We also believe that the extensive amount of materials to be released through our regional reports and the format of such reports will more readily meet the needs of the extensive public and private audiences for such information--thereby contributing to efforts to develop balanced resource management policies with regard to OCS resources. While reliable resources estimates are only one of many factors to be considered when making OCS resource management

decisions, they are an important component and should be based on high quality science. We are confident that our new assessment produced results that met that high standard.

Madam Chairman, this concludes my prepared remarks. However, I will be pleased to answer any questions Members of the Subcommittee may have.

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